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| APPLICATION NO.   | FILING DATE | FIRST NAMED INVENTOR | ATTORNEY DOCKET NO. | CONFIRMATION NO.  |
|---|-------------|----------------------|---------------------|-------------------|
| 09/751,614  | 12/29/2000  | Phil Geng            | 884.387US1          | 8591              |
| 21186   | 7590        | 06/07/2004           | EXAMINER            |                   |
| SCHWEGMAN, LUNDBERG, WOESSNER & KLUTH, P.A.<br>P.O. BOX 2938<br>MINNEAPOLIS, MN 55402 |             |                      |                     | CHAMBLISS, ALONZO |
| ART UNIT  |             | PAPER NUMBER         |                     |                   |
|   |             |                      |                     | 2827              |

DATE MAILED: 06/07/2004

Please find below and/or attached an Office communication concerning this application or proceeding.

|                              |                        |                     |  |
|------------------------------|------------------------|---------------------|--|
| <b>Office Action Summary</b> | <b>Application No.</b> | <b>Applicant(s)</b> |  |
|                              | 09/751,614             | GENG ET AL.         |  |
|                              | <b>Examiner</b>        | <b>Art Unit</b>     |  |
|                              | Alonzo Chambliss       | 2827                |  |

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

#### Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

#### Status

- 1) Responsive to communication(s) filed on 25 March 2004.
- 2a) This action is FINAL.                    2b) This action is non-final.
- 3) Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

#### Disposition of Claims

- 4) Claim(s) 18-25,27,28,30-43 and 45-47 is/are pending in the application.
- 4a) Of the above claim(s) \_\_\_\_\_ is/are withdrawn from consideration.
- 5) Claim(s) \_\_\_\_\_ is/are allowed.
- 6) Claim(s) 18-25,27,28,30-43 and 45-47 is/are rejected.
- 7) Claim(s) \_\_\_\_\_ is/are objected to.
- 8) Claim(s) \_\_\_\_\_ are subject to restriction and/or election requirement.

#### Application Papers

- 9) The specification is objected to by the Examiner.
- 10) The drawing(s) filed on \_\_\_\_\_ is/are: a) accepted or b) objected to by the Examiner.  
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).  
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

#### Priority under 35 U.S.C. § 119

- 12) Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) All    b) Some \* c) None of:  
 1. Certified copies of the priority documents have been received.  
 2. Certified copies of the priority documents have been received in Application No. \_\_\_\_\_.  
 3. Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

\* See the attached detailed Office action for a list of the certified copies not received.

#### Attachment(s)

- 1) Notice of References Cited (PTO-892)
- 2) Notice of Draftsperson's Patent Drawing Review (PTO-948)
- 3) Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08)  
Paper No(s)/Mail Date \_\_\_\_\_
- 4) Interview Summary (PTO-413)  
Paper No(s)/Mail Date. \_\_\_\_\_
- 5) Notice of Informal Patent Application (PTO-152)
- 6) Other: \_\_\_\_\_

## **DETAILED ACTION**

### ***Continued Examination Under 37 CFR 1.114***

1. A request for continued examination under 37 CFR 1.114, including the fee set forth in 37 CFR 1.17(e), was filed in this application after final rejection. Since this application is eligible for continued examination under 37 CFR 1.114, and the fee set forth in 37 CFR 1.17(e) has been timely paid, the finality of the previous Office action has been withdrawn pursuant to 37 CFR 1.114. Applicant's submission filed on 3/25/04 has been entered.

### ***Response to Arguments***

2. Applicant's arguments with respect to claims 18-25, 27, 28, 30-43, and 45-47 have been considered but are moot in view of the new ground(s) of rejection.

### ***Claim Rejections - 35 USC § 102***

3. The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless –

(b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

4. Claims 18-21, 25, 27, 28, 30-37, 42, 43, and 45-47 are rejected under 35 U.S.C. 102(b) as being clearly anticipated by Barrow (U.S. 5,706,178).

With respect to Claim 18, Sherman teaches a substrate 14 comprising a plurality of mounting lands 20' to mount corresponding contacts of an integrated circuit package

12, wherein each land having a geometric center. Each land 20' has a hollow via 30 therein that is offset with respect to the geometric center of the land, wherein each via comprises a via cap 38, 58. A plurality of solder balls 36 each solder ball adhering to a respective one of the lands 20' (see col. 3 lines 30-40; Figs. 2 and 4-7).

With respect to Claim 19 and 35, Barrow teaches that each via has a geometric center, and wherein the geometric center of each via 30 is in a region between the geometric center and the perimeter of its associated land 20' (see Figs. 6 and 7).

With respect to Claims 20 and 36, Barrow teaches that the geometric centers of vias 30 of adjacent lands 20' are offset in substantially the same direction (see Figs. 6 and 7).

With respect to Claims 21 and 33, Barrow teaches an electronic assembly comprising: an integrated circuit package 12 having a plurality of contacts, a substrate 14 having a plurality of lands 20'. Each land 20' having a geometric center and an edge, each land having a via 30 therein extending into the substrate 14, wherein each via having a geometric center in a region between the geometric center and the edge of its associated land 20'. A plurality of solder balls 36, each coupling one of the plurality of contacts to a respective one of the plurality of lands 20'. The solder balls 36 is contacting substantially the entire respective land 20' to the edge of such land (see col. 3 lines 30-40; Figs. 2 and 4-7).

Regarding Claim 25, Barrow teaches that the lands 20' comprise a first group (i.e. the vias on the left side of the substrate) having vias 30 offset in a first direction,

and a second group (i.e. the vias on the right side of the substrate) having vias offset in a second direction (see Figs. 2 and 4-7).

With respect to Claims 27, 30, Barrow teaches that the geometric centers of vias 30 of adjacent lands 20' are offset from the geometric centers of such lands 20' in the same direction (see Figs. 6 and 7).

With respect to Claim 28, Barrow teaches an electronic system comprising an electronic assembly having: an integrated circuit package 12 having a plurality of pads, a substrate 14 having a plurality of mounting lands 20', each land 20' having a geometric center and an edge, each land having a via 30 therein. Each via 30 has a geometric center in a region between the geometric center and the edge of its associated land 20'. A plurality of solder balls 36, each coupling one of the plurality of pads to a respective one of the plurality of lands, wherein each of the solder balls 36 is contacting substantially the entire respective land 20' to the edge of such land (see col. 3 lines 30-40; Figs 2 and 4-7).

With respect to Claims 31 and 32, Barrow teaches wherein each 20' has an edge defining a perimeter, and wherein each solder ball 36 covers the entire respective land 20', including the perimeter and within the perimeter of such land 20' (see Figs. 4 and 5).

With respect to Claim 34, Barrow teaches a plurality of lands 20', each land having a geometric center, wherein each land has a via 30 therein that is offset with respect to the geometric center of the land 20'. A plurality of solder balls 36, wherein each solder ball 36 adhering to a respective one of the lands 20' without any material

intervening between the solder ball and the respective land (see col. 3 lines 30-40; Figs. 2 and 4-7).

With respect to Claims 37, 42, 43, and 45-47, Barrow teaches an electronic assembly comprising an integrated circuit package 12 having a plurality of contacts and a inherent centerline separating the plurality of contacts into two substantially equal portions (i.e. contacts on the left and right sides of the top surface). A substrate 14 having a plurality of lands 20' respectively aligned with the plurality of contacts, wherein at least the contacts or the lands are coated with a solder from the solder bump 36, each land having a geometric center and the land has a circular via 30 offset therein extending into the substrate 14. Each via 30 having a geometric center located in a first and second regions that are in respective first and second direction between the geometric center and the perimeter of its associated land 20', wherein the circular lands 20' comprise a first group (i.e. the lands on the left side of the top surface of the substrate) having vias offset in a first direction and a second group (i.e. the lands on the right side of the top surface of the substrate) having vias offset in a second direction. The first and second groups are on opposite sides of the centerline (see col. 3 lines 30-40; Figs. 2 and 4-7).

### ***Claim Rejections - 35 USC § 103***

5. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

- (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the

invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

This application currently names joint inventors. In considering patentability of the claims under 35 U.S.C. 103(a), the examiner presumes that the subject matter of the various claims was commonly owned at the time any inventions covered therein were made absent any evidence to the contrary. Applicant is advised of the obligation under 37 CFR 1.56 to point out the inventor and invention dates of each claim that was not commonly owned at the time a later invention was made in order for the examiner to consider the applicability of 35 U.S.C. 103(c) and potential 35 U.S.C. 102(e), (f) or (g) prior art under 35 U.S.C. 103(a).

6. Claims 22-24 and 38-41 are rejected under 35 U.S.C. 103(a) as being unpatentable over Barrow (U.S. 5,706,178).

With respect to Claim 22, Barrow discloses that each has a thermally expansive substance 38,58 residing in the via 30 (see Figs. 4 and 5). The limitation: "inhibits from causing adjacent contacts of the integrated circuit package to be bridged when the lands and contacts are subjected to heat", is an intended use limitation and it has been held that a recitation with respect to the manner in which a claimed apparatus is intended to be employed does not differentiate the claimed apparatus from a prior art apparatus satisfying the claimed structural limitations. Ex Parte Masham, 2 USPQ F.2d 1647 (1987).

With respect to Claim 23, Barrow fails to explicitly teach that the thermally expansive substance comprises a volatile organic compound. It would have been obvious to one having ordinary skill in the art at the time the invention was made to

make the thermally expansive substance comprising a volatile organic compound, since it has been held to be within the general skill of a worker in the art to select a known material on the basis of its suitability for the intended use as a matter of obvious design choice. In re Leshin, 125 USPQ 416.

With respect to Claim 24, Barrow discloses that the thermally expansive substance 38 forms a portion of a solder mask (see col. 3 lines 42-50). Barrow fails to explicitly teach that the thermally expansive substance comprises a volatile liquid. It would have been obvious to one having ordinary skill in the art at the time the invention was made to make the thermally expansive substance comprising a volatile liquid, since it has been held to be within the general skill of a worker in the art to select a known material on the basis of its suitability for the intended use as a matter of obvious design choice. In re Leshin, 125 USPQ 416.

Regarding Claim 38, the limitation that: "wherein, during a solder reflow operation, surface tension forces in molten solder residing between the respectively aligned contacts and lands are substantially equalized between the first and second groups of lands", is a product by process limitation. (if the product in the product-by-process claims are the same as or obvious from a product of the prior ad, the claims are unpatentable even tough the prior product was made by a different process. See In re Thorpe, 227 USPQ 964,966 (Fed.Cir 1985). A "product by process" claim is directed to the product per se, no matter how actually made, In re Brown, 173 USPQ 685'; In re Luck, 177 USPQ 523; In re Fessmann, 180 USPQ 324; In re Avery, 186 USPQ 161 ; In re Wedheim, 191 USPQ 90 (209 USPQ 554 does not deal with this issue); In re Marosi

et al, 218 USPQ 289: and particularly In re Thorpe, 227 USPQ 964, all of which make it clear that it is the patentability of the final product per se which must be determined in a "product by process" claim, and not the patentability of the process, and that an old or obvious product produced by a new method is not patentable as a product, whether claimed in "product by process" claims or not. Note that applicant has the burden of proof in such cases, as the above case law makes clear.

With respect to Claim 39, Barrow discloses that each via has a thermally expansive substance residing 38, 58 in the vias. The limitation: "inhibits from causing adjacent contacts of the integrated circuit package to be bridged when the lands and contacts are subjected to heat, is an intended use limitation and it has been held that a recitation with respect to the manner in which a claimed apparatus is intended to be employed does not differentiate the claimed apparatus from a prior art apparatus satisfying the claimed structural limitations. Ex Parte Masham, 2 USPQ F.2d 1647 (1987).

With respect to Claim 40, Barrow fails to explicitly teach that the thermally expansive substance comprises a volatile organic compound. It would have been obvious to one having ordinary skill in the art at the time the invention was made to make the thermally expansive substance comprising a volatile organic compound, since it has been held to be within the general skill of a worker in the art to select a known material on the basis of its suitability for the intended use as a matter of obvious design choice. In re Leshin, 125 USPQ 416.

With respect to Claim 41, Barrow discloses a thermally expansive substance forms a portion of a solder mask 38 (see col. 42-50). Barrow fails to explicitly disclose teach that the thermally expansive substance comprises a volatile liquid. It would have been obvious to one having ordinary skill in the ad at the time the invention was made to make the thermally expansive substance comprising a volatile liquid, since it has been held to be within the general skill of a worker in the art to select a known material on the basis of its suitability for the intended use as a matter of obvious design choice.

In re Leshin, 125 USPQ 416.

The prior art made of record and not relied upon is cited primarily to show the product of the instant invention.

### *Conclusion*

7. Any inquiry concerning the communication or earlier communications from the examiner should be directed to Alonzo Chambliss whose telephone number is (703) 306-9143. The fax phone number for this Group is (703) 308-7722 or 7724.

Any inquiry of a general nature or relating to the status of this application or proceeding should be directed to the Group receptionist whose telephone number is (703) 308-7956



Alonzo Chambliss  
Primary Patent Examiner  
Art Unit 2827